

Colorado Department of Health
Hazardous Materials & Waste Management Division

Comments

on

DRAFT

TECHNICAL MEMORANDUM NO. 2

FOR

PHASE I RFI/RI of OU-3

EXPOSURE SCENARIOS

April 23, 1993

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- 1) Section 2.2: The second paragraph in this section misinterprets the purpose of the OU 3 investigations. These investigations are to assess the risk of exposure to potential contamination within OU 3. Regardless of where this contamination may have originated, the contaminated media in OU 3 are now themselves considered potential sources of contamination. In addition, statements that "RFP is no longer a source of contamination", and "current operations at the RFP meet all state and federal standards" are incorrect.
- 2) Section 3.0: It is unclear why populations in sectors 2 and 3 are not projected to increase in Table 1 and in Figures 2 and 3. Sections 3.2.1.1, 3.2.3.1, and 3.2.4.1 all mention potential residential development just east of Indiana Street.
- 3) Section 3.1.1.4: More detail should be provided on the gardening habits of residents who live in agricultural settings before dismissal of this potential exposure pathway.
- 4) Section 3.1.4.4: Since "Mower Reservoir water is used to irrigate the pasture land and water the livestock of the farmer who owns it", a current agricultural use scenario should be assessed if the homegrown beef makes up a significant portion of this farmer's diet. If so, this possibility needs to be researched, and the intake calculations performed.
- 5) Section 3.2.1.4: To assess the probability of future agricultural land use, DOE has relied on county zoning projections and appears not to have consulted current land owners. For example, Bini Abbott and her husband intend to continue farming, and their daughter may continue after they retire.

- 6) Section 3.2.2.3: The Future Recreational/Open Space Land Use scenario should also consider dermal contact with water and sediment occurring during activities such as swimming, boating, and hiking.
- 7) Section 4.2.1: References should be cited for the discussion on page 8 of Section 4 of deposition of radionuclides on foliar surfaces, root uptake of radionuclides, and cumulative uptake rates. Oxidized forms of plutonium can solubilize to a limited extent and can be absorbed, particularly by the roots of crops (Garland et al., 1981, J. Agric. Food Chem. 29:915-920). The stems and leaves in general have lower concentrations of plutonium than the roots, but higher concentrations of soluble plutonium (ATSDR Toxicological profile for Plutonium, Dec. 1990), indicating some mobility in plants, though Adriano et al. (Transuranic elements in the environment, Ed: W. Hanson, Tech. Info. Center, USDOE/TIC-22800, 1980) reported that peeling of potatoes and beets removed 99% of the residual plutonium. Plutonium concentrations were higher in the foliage biomass than in the fruits of vegetable crops grown at Oak Ridge and higher in grain crops grown at the Savannah River Plant than in control crops (ATSDR Toxicological profile for Plutonium, Dec. 1990). Sullivan et al. (1980) (referenced in ATSDR Toxicological profile for Plutonium, Dec. 1990) reported that rodents absorbed more Pu-238 when it was incorporated into alfalfa grown on soil containing plutonium than when it was administered in the inorganic form. Thus organically-bound plutonium may be more bioavailable than inorganic plutonium. For these reasons, root uptake of radionuclides by plants and the potential risks (however small) of subsequent ingestion of these plants by humans should be evaluated.
- 8) Section 4.2.1: It is not clear why ingestion of homegrown leafy vegetables would be eliminated as a pathway for the future residential scenario when this pathway contributed the greatest risk at a set soil concentration of 1 pCi/g in the Final Past Remedy Report. Because it was the major pathway, elimination of this pathway does not seem justified, even given the arguments that plutonium does bioconcentrate or is not taken up by plants to any great extent. Moreover, simply because not many gardens exist in OU3 now, does not imply that the intake of garden produce in the future should not be assessed.
- 9) Section 4.2.2: In the middle of page 16 of Section 4, "Subsection 4.1.1.1" is referenced, but no such section exists in this technical memorandum.
- 10) Section 4.2.2: Dermal exposure to sediments and surface water are shown as potential pathways in Figures 4-3 and 4-4; these pathways should be assessed.
- 11) Section 4.2.3 : This paragraph should state that the exposure to external radiation pathway will be assessed.
- 12) Section 4.3.4: The impacts of Rocky Flats on the existing small cattle herds and their owners should be assessed. DOE needs to provide evidence that the owners of these herds do not eat a significant amount of homegrown beef before dismissing this possibility.
- 13) Section 4.4.4: In addition, the office worker receptor should not be eliminated since

that receptor provides a way to look at long-term exposures. Office workers should be assessed for inhalation of suspended soil particles in air, external radiation, and ingestion of soil and indoor dust.

14) Section 4.4.7: The definition of a family farm is too limiting. Because a farmer is not totally self-sufficient does not mean that he and his family do not get exposed at all. These people will want to know the risk from Rocky Flats because of their proximity to the plant.

15) Sections 4.5.2: The possibility that the reservoir will be drained and be developed or used for recreational purposes means that inhalation, ingestion and direct dermal contact with deeper sediments as well as surface sediments should be assessed for the future residential and future commercial/industrial scenarios. Since building construction is possible, a construction worker scenario should be assessed. If the reservoir is not drained, dermal contact with water and sediments would become a viable pathway.

16) Section 4.5.4: Direct dermal contact with sediments should be included in the future commercial/industrial scenario.

17) Sections 4.5.5 and 4.5.6: Direct dermal contact with water and sediments should be assessed for current and future recreational exposure scenarios.

18) Section 4.6: Direct dermal contact with water and sediments should be included in current and future residential and recreational scenarios and in the future commercial/industrial scenario.

19) Section 4.6.7: See comment #24 on agricultural scenario above.

20) Section 5.2: The final sentence on page 5 should refer to Tables 5-1 through 5-8.

21) Tables 5-1, 5-2, and 5-8: The assumption in these tables that 25% of inhaled particles are deposited in the lungs per se is true. However, deposition can also occur in other parts of the respiratory tract and exert health effects. Moreover, the same table in the same study that the 25% figure came from also states that 50% of inhaled particles are deposited in the upper respiratory passages and are subsequently swallowed and retained by the body (EPA, 1985). Because baseline risk assessments are concerned with overall health effects of inhalation and not simply lung effects, the usual value used for depositional fraction is 75%. A wide variety of sources indicate that 25% is too low a value for depositional fraction. These include the soil dust inhalation estimates of Hawley (Risk Analysis 5:(4) 289-302, 1985), The International Commission on Radiological Protection (ICRP, 1980) study which states that for aerosols with a mean aerodynamic diameter between 0.2 μ m and 20 μ m, the sum of the fractions deposited in the three regions of the respiratory tract varies from about 60% to 90%, and the USEPA's second addendum to air quality criteria for particulate matter and sulfur oxides (EPA/600/8-86-020f. 1982). If applied at all, a value of 75% is recommended.

22) Tables 5-5 and 5-6: The body weight listed in this table is inappropriate for 7-18 year old children and adolescents. The mean weight recommended for this age group (males) in EPA's Exposure Factors Handbook is between 23 and 65 kg. It is not clear why DOE decided to assess the 7-18 year-old age group for sediment ingestion using a soil ingestion rate that is more appropriate for young children. It is also not clear why younger children (<7 years) are not being assessed, since this group is the one with the hand-to-mouth behaviors that contribute to its designation as a sensitive population, and since it is questionable whether many 18-year olds spend a lot of time playing in creeks where they would be exposed to sediments. Simply because younger children are generally under the supervision of older people does not mean that they would not play in sediments or shallow water. DOE should assess the exposure rate for young children (<6 years), and should use the appropriate ingestion and dermal contact rates for that age range.

23) Table 5-8: Please describe the activity assumptions that were made to calculate the RME inhalation rate for a child in this table.

Summary of additional exposure scenarios to be assessed:

- fruit and vegetable intake for residents, both children and adults;
- dermal exposure to contaminants contained in soil, sediments, or water for both adults and children in residential and recreational scenarios;
- inhalation, ingestion, and dermal contact with deeper sediments in the event that Great Western Reservoir is drained;
- local fish consumption from Standley Lake;
- general agricultural scenario, unless DOE can provide evidence that local herd owners do not eat a significant portion of homegrown meat, dairy products and produce.